

NEOTROPICAL COCKROACHES OF THE GENUS *XESTOBLATTA*:  
A NEW SPECIES FROM COSTA RICA AND NOTES  
ON OTHER SPECIES

(DICTYOPTERA: BLATTARIA: BLATTELLIDAE)

FRANK W. FISK and ASHLEY B. GURNEY<sup>1</sup>

This is the first of several studies of cockroach systematics that had their original incentive in collections made by one of us (Fisk) in Costa Rica; material from other collectors and consultation with leading reference collections have enabled us to broaden the review associated with new species which have been found. The present study includes the description of a new Costa Rican species of *Xestoblatta* that is particularly interesting because of its close relationship to *X. buscki* Gurney. The two species differ especially in the degree of development of the specialized glandular area of the male abdomen. In *buscki*, an oval area is lightly outlined on tergum 7 (fig. 4), but in the new species it is fully developed as a deep pitlike organ. Males of many of the species in this genus possess remarkable abdominal specializations of a glandular type that are attractive to females during mating. Therefore, the occurrence of two species that are so similar except in the extent of dorsal specialization is significant because of current interest in modifications related to mating behavior and also because the specialization probably reflects evolutionary development in closely related species.

As an aid to other students, we have followed the description of the new species with a list of other species of *Xestoblatta* that have been described since the genus was revised by Gurney (1939) and have also appended a list of references to species mentioned in the literature since 1939. To save space, only citations of these references, rather than the full titles, are given.

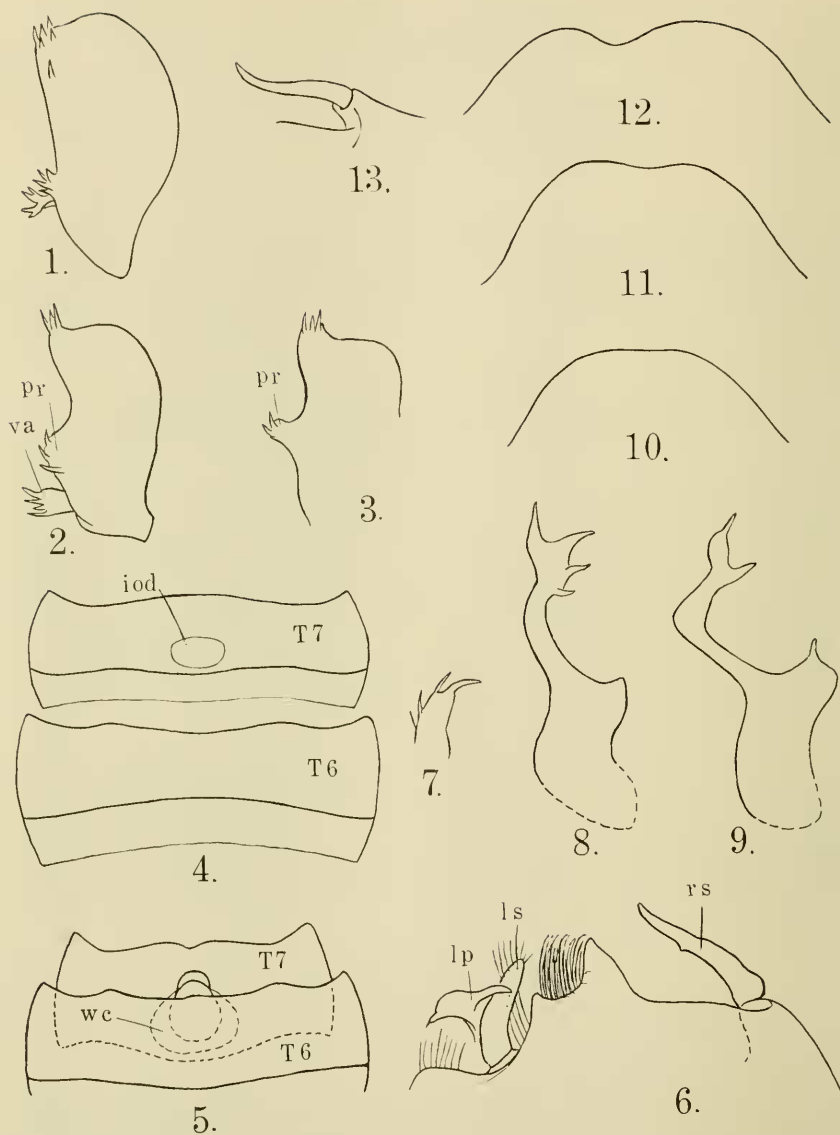
***Xestoblatta cantralli*, n. sp.**

(Figs. 2, 3, 5-8, 10, 13)

*Male* (holotype).—Turrialba, Costa Rica. May 28, 1951 (O. L. Cartwright) (USNM 69699).

Size medium for group; tegmina well developed, extending nearly to apices of cerci. Interocular space with lateral margins nearly parallel; width at vertex 0.8 mm, slightly narrower than distance between ocellar spots. Ulnar vein (Cubitus) of wing with 3 rami reaching margin, 2 short incomplete rami going to anal vein (based on paratype from La Lola since holotype has indistinct wing venation). Sixth abdominal tergum weakly, broadly emarginate along caudal

<sup>1</sup> Department of Entomology, Ohio State University, Columbus, Ohio 43210, and Systematic Entomology Laboratory, U. S. Department of Agriculture, c/o U. S. National Museum, Washington, D. C. 20560, respectively.



Figs. 1, 4, 9, 11, 12, *Xestoblatta buscki* Gurney: 1, ♂ paratype, Barro Colorado Is., right paraproct, dorsal view, KOH prep.; 4, ♂ paratype, Barro Colorado Is., abdominal terga 6 & 7, dorsal view, KOH prep.; 9, ♂ paratype, Barro Colorado Is., 2nd sclerite of right phallomere, dorsal view, KOH prep.; 11, ♂ (in alcohol), Tilaran, C. R., posterior margin of supra-anal plate, ventral view, KOH prep.; 12, ♂ paratype, Barro Colorado Is., same as 11. Figs. 2, 3, 5-8, 10, 13, *X. cantralli*, n. sp.: 2, holotype, right paraproct, dorsal view, KOH prep.; 3, ♂ paratype, La Lola, C. R., posterior portion of right paraproct, dorsal view, dry specimen; 5, holotype, terga 6 & 7, dorsal view, KOH prep.; 6, holotype,

margin; latter overlaps, partially covers pit opening on tergum 7. Seventh tergum bears deep median pit that enlarges just beneath opening so that diameter of cavity is greater than that of entrance pore, larger internal wall or collar of pit (fig. 5 *uc*) evident; caudal margin of tergum 7 narrowly emarginate medially, lateral angles produced. Eighth tergum nearly concealed; posterior margin of broadly rounded supra-anal plate with slight suggestion of emargination at apex (fig. 10). Subgenital plate in ventral view as in fig. 6; left paraproct (*lp*) bears slender curved spiniform process ending in single sharp point; left stylus gently curved medially near apex, blunt at apex; posterior margin of subgenital plate with asymmetrical, strongly sclerotized, furcate projection between styli, its right branch the larger; 2 tufts of strong setae, 1 composed of setae closely grouped together and with straight tips, the other group arranged in a dense row with their tips hooked, project from near left paraproct and appear just dorsad of furcate projection of subgenital plate; right paraproct specialized in the form of mitten-shaped plate with armed ventral appendage (fig. 2, *va*) projecting from beneath posterior margin. Hooklike second sclerite of right phallomere ( $R_2$  of McKittrick, 1964) as in fig. 8.

Coloration.—Pronotum with pale yellow lateral and anterior margins grading into mottled brown disk. Tegmen cinnamon brown, slightly paler along costal margin, with transparent yellow in marginal field; shiny, with faint metallic luster. Wing transparent, brownish buff with noticeable blackish tinge anteriorly from branched axillary vein; costal margin grading into light tan. Face pale buff; interocular space brown, paling toward occiput; brown band between antennal sockets, fading at extremities; clypeus tan; labrum brown; distal segment of maxillary palpus pale brown, other segments and labial palpi pale, off-white. Legs pale, with brown at bases of spines; each coxa with 2 brownish-black spots in area that receives femur in repose, 1 near base, other near apex, the distal spot paler. Ventral surface of abdomen pale along lateral margins, darker medially and toward apex, distinctive blackish spots at laterocephalic angles of sterna 2-7 (corresponding to locations of spiracles). Subgenital plate brown, with pale margins except for posterior forked projection, which like right stylus, is heavily sclerotized, deep brown. Cerci deep brown ventrally and laterally, pale dorsally.

Measurements (in millimeters).—Length of body, 17.0; of pronotum, 3.6; of tegmen, 15.0; of hind tibia, 6.5; width of pronotum, 5.1.

*Female* (allotype).—La Lola (0.5 mi. w. of Madre de Dios), Limón Prov., Costa Rica. Oct. 2, 1961 (T. H. Hubbell, I. J. Cantrall, and T. J. Cohn) (University of Michigan, Museum of Zoology).

General form as in male. Interocular space with lateral margins parallel, 0.8

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subgenital plate and appendages, ventral view, KOH prep.; 7, paratype, La Lola, C. R., apical portion of left paraproct, ventral view, dry specimen; 8, holotype, 2nd sclerite of right phallomere, dorsal view, KOH prep.; 10, holotype, posterior margin of supra-anal plate, ventral view, KOH prep.; 13, ♂ paratype, La Lola, C. R., right stylus and attachment to subgenital plate, ventral view, dry specimen. Abbreviations: *iod*, faintly impressed oval depression of specialized area; *lp*, left paraproct; *ls*, left stylus; *pr*, projection from posterior margin of right paraproct; *rs*, right stylus; *T6*, tergum 6; *T7*, tergum 7; *va*, ventral appendage of right paraproct; *uc*, wider internal "collar" of specialized pit. Drawings by A.B.G.

mm wide; ocellar spots conspicuous, white. Abdomen somewhat stout. Tegmina surpassing apices of cerci; wing with 4 complete and 1 incomplete rami of ulnar vein. Abdomen with terga unspecialized, broadly rounded at apex.

Coloration.—Essentially as in male. Dark bands across distal portions of abdominal terga and lateral dark spots on sterna somewhat more pronounced than in male. Subgenital plate dark brown centrally, grading into yellow on lateral margins. Median proximal portion of plate bears a lighter brown triangular spot with its apex directed posteriorly.

Measurements (in millimeters).—Length of body, 19.3; of pronotum, 4.5; of tegmen, 17.1; of hind tibia, 7.4. Width of pronotum, 5.7.

Variation.—One of the dry pinned male paratypes has the right stylus more smoothly curved, without any indication of serrations on the shaft, also with the base exerted from the posterior margin of the subgenital plate, unlike the condition in the relaxed and KOH-treated preparation from the holotype. The "thumb," that is, the projection from the posterior margin of the dorsal surface of the right paraprot (figs. 2, 3, *pr*), is more developed in some males than others, and the ventral appendage (*va*), though present, is largely concealed in some specimens due to the position of the genital parts. The left paraprot of the holotype (fig. 6, *lp*) is short, though with a more complex apical part in some paratypes (fig. 7), but it is not as slender as in *buscki*. In some paratypes the folded tegmina briefly surpass the apices of cerci. There is moderate variation in body size, and 1 of the largest male paratypes has the following measurements: length of body, 19.5 mm; of pronotum, 4.3; of tegmen, 18.3; of hind tibia, 8.0; width of pronotum, 5.7.

*Specimens examined*: 19 (Holotype, allotype, 11 ♂, 6 ♀ paratypes). Paratypes as follows (all Costa Rica): La Lola (0.5 mi. w. of Madre de Dios), Limón Prov., Oct. 2, 1961 (Hubbell, Cantrall, and Cohn), 5 ♂♂, 5 ♀♀; Los Diamantes (1 km. e. of Guápiles), Limón Prov., Jan. 27, 1967 (I. J. Cantrall), 4 ♂♂; Puerto Limón, July 7, 1966 (T. H. Hubbell), 1 ♂, 1 ♀; La Selva (Holdridge Estate), Heredia Prov., Nov. 13, 1964 (T. H. Hubbell), 1 ♂. (Paratypes deposited at Museum of Zoology, University of Michigan, at Department of Entomology, Ohio State University, and at U. S. National Museum).

We are glad to name this species in honor of our friend Irving J. Cantrall, the University of Michigan, one of the collectors, as a tribute to his consistent success in collecting Orthoptera, and to his notable curatorial accomplishments in the development of the Orthoptera collection at Michigan from which we have been privileged to borrow for study most of the specimens of this interesting new species.

In addition to the interesting distinction between *buscki* and *cantralli* with respect to tergal specialization, the following differences, all in male genitalia, occur. (Figs. 36, 42, 69 of Gurney, 1939, show genitalia of *buscki*):

1. Right stylus broadly curved near base in *buscki*, not so in *cantralli*.
2. Furcate median projection of posterior margin of subgenital plate with point on right side proportionally longer in *cantralli*.

3. Right paraproct with posterior margin more emarginate in *cantralli*, giving more of mittenlike appearance (compare with *buscki*, fig. 1).
4. Left paraproct more elongate in *buscki*.
5. Hook-shaped sclerite ( $R_2$ ) of right phallomere (figs. 8, 9) differs in detail in the two species.

The weak development of tergal specialization in *buscki* was overlooked when *buscki* was originally described, an illustration of the way the less conspicuous tergal specialization of cockroaches has often been unnoticed.

Certain variation in *buscki* was noted with the original description. Also some variation in the posterior margin of the supra-anal plate occurs. Dry specimens of *buscki* show scarcely any emargination of that margin. One paratype (fig. 12) from which a KOH preparation has been made is emarginate and somewhat asymmetrical. A Costa Rican male, not previously reported and preserved in alcohol, has the margin weakly emarginate (fig. 11). Dry specimens at hand show scarcely any emargination.

#### NEW SPECIES OF *Xestoblatta* DESCRIBED SINCE 1939

- X. amaparica* R.-S. Albuquerque and Gurney, 1962, *Studia Ent.* 5:250, figs. 30-35. From Territory of Amapá, Brazil.
- X. bananae* R.-S. Albuquerque, 1962, *Proc. Ent. Soc. Wash.* 64:244, figs. 6-11. From Ecuador.
- X. iani* R.-S. Albuquerque, 1964, *Rev. Brazil. Biol.* 24(1):11, figs. 1-8. From Belém, Brazil.
- X. surinamensis* Bruijning, 1959, *Studies Fauna Suriname and other Guyanas (Uitgaven Nat. Studiek. Suriname Nederlandse Antillen, 18)* 2:74, figs. 22-23. From Tibiti savanna, Surinam.
- X. tingomariensis* R.-S. Albuquerque, 1962, *Proc. Ent. Soc. Wash.* 64:114-116, figs. 1-5. From Tingo Maria, Peru.

#### REFERENCES TO PREVIOUSLY DESCRIBED SPECIES OF *Xestoblatta* PUBLISHED SINCE 1939

- X. amaparica* R.-S. Albuquerque and Gurney. R.-S. Albuquerque. 1964. *Bol. Mus. Paraense Emilio Goeldi* 41:28 (Brazil list); R.-S. Albuquerque. 1964. *Ibid.* 45:17 (Venezuela).
- X. braziliac* Gurney. R.-S. Albuquerque. 1964. *Ibid.*, 41:29 (Brazil list).
- X. castanea* Hebard. Bruijning. 1959. *Stud. Fauna Suriname, other Guy.* 2:73, fig. 21 (Surinam).
- X. ecuadorana* Gurney. Princis. 1941. *Ark. Zool.* 41(3):14 (Bolivia).
- X. immaculata* Hebard. R.-S. Albuquerque. 1964. *Bol. Mus. Paraense Emilio Goeldi* 41:29 (Brazil list).
- X. micra* Hebard. Princis. 1951. *Spolia Zool. Mus. Hauniensis* 12:45 (Brit. Guiana).
- X. nyctiboroïdes* (Rehn). Bruijning. 1959. *Stud. Fauna Suriname, other Guy.* 2:74 (Discussion).

- X. para* Hebard. R.-S. Albuquerque. 1964 Bol. Mus. Paraense Emilio Goeldi 41:29 (Brazil list).  
*X. ramona* Gurney. R.-S. Albuquerque. 1964. *Ibid.* 41:29 (Brazil list).  
*X. surinamensis* Bruijning, R.-S. Albuquerque. 1965. *Ibid.* 57:9 (Brazil).

## REFERENCES CITED IN DISCUSSION

- Gurney, A. B. 1939. A revision of the Neotropical genus *Xestoblatta* Hebard (Orthoptera; Blattidae; Pseudomopinae). Proc. Ent. Soc. Wash. 41:97-128, 73 figs.  
McKittrick, F. A. 1964. Evolutionary studies of cockroaches. Cornell Univ. Agr. Exp. Sta. Mem. 389, 197 pp., 205 figs., 6 text-figs.

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DIPTEROUS EGGS AS FOOD FOR ADULT COCCINELLIDAE  
(COLEOPTERA: COCCINELLIDAE)

During the summer of 1967 it was observed that numerous adult Coccinellidae, primarily the convergent lady beetle (*Hippodamia convergens* Guérin-Méneville), were feeding on aphids (species not identified) on black locust trees (*Robinia Pseudo-Acacia* L.) adjacent to a parking lot in west Baltimore, Maryland. Approximately one hundred of these were collected and placed in an aluminum frame and screen cage, measuring 1 ft<sup>3</sup>. The beetles were maintained in the laboratory at a temperature of 75°F ± 2°F. Water was provided by soaking absorbent cotton in a small petri dish and placing it on the floor of the cage.

After two days without food the beetles were offered the eggs of a mosquito, *Aedes aegypti* (L.). These eggs had previously been deposited on paper toweling. The beetles fed on the *Aedes* eggs readily and over night the paper toweling was completely cleared of several thousand mosquito eggs. *Aedes* eggs were provided daily for seven days. During this time the beetles remained active and in apparent good health. After seven days of feeding on mosquito eggs the food was changed to eggs of *Musca domestica* L. an approximate one-half teaspoon being placed in the cage daily. The beetles were maintained for a period of ten days on this latter food. Unfortunately, the pressure of other duties precluded further observation and the colony was released.

Observations made during daily feedings revealed copulating pairs on several occasions. There were, however, no eggs deposited by the beetles during the period of observation. The mortality over the twenty day period was approximately ten percent.

These observations may be of general interest, and further, might encourage a study of other possible foods that may be useful for rearing complete cycles, or providing economical means of rearing colonies of these highly beneficial insects.—JAMES W. GENTRY and EUGENE J. GERBERG, *Insect Control & Research, Inc.*, 1111 N. Rolling Road, Baltimore, Maryland 21228.